DENON

Hi-Fi Component Amplifier

SERVICE MANUAL

MODEL PMA-830

SOLID STATE STEREO INTEGRATED AMPLIFIER

NIPPON COLUMBIA CO., LTD.

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SPECIFICATIONS

MAIN AMPLIFIER SECTION

Type: All stages pure complementaly push-pull system DC circuit

Rated Output (both channels driven)

20 Hz to 20 kHz (at 8 ohm)

Class B operation: 65 W at each channel (T.H.D. 0.01%)

Class A operation: 15 W at each channel (T.H.D. 0.005%)

1 kHz (at 4 ohm, T.H.D. 0.02%)

Class B operation: 90 W at each channel

Total Harmonic Distortion

Class B operation: less than 0.01%

Class A operation: less than 0.005%

Intermodulation Distortion

60 Hz/7 kHz = 4/1: less than 0.01% (at equivalent rated output)
less than 0.01% (at 1 watt output)

Power Bandwidth

Class B operation: 5 Hz to 80 kHz (IHF, T.H.D. 0.05%)

Class A operation: 5 Hz to 100 kHz (IHF, T.H.D. 0.05%)

Transmission Characteristic: DC to 100 kHz $^{+0}_{-1}$ dB (at 1 watt output)

Input Sensitivity: 1 volt r.m.s.

Input Impedance: 50 k ohm

Output Impedance: less than 0.16 ohm

Signal to Noise Ratio: 122 dB

Output Terminals

Speaker: A & B, 4 to 16 ohm load
A + B, 8 to 16 ohm load

Headphone: for Stereo Headphone

PRE AMPLIFIER SECTION

Pre Amplifier Output

Max. Output: 25 V

Rated Output: 1 V

Total Harmonic Distortion: 0.003% (at 3 V output)

Equalizer Amplifier Output

Max. Output: 25 V (T.H.D. 0.01% at 50 k ohm load)

Rated Output: 320 mV

Input Sensitivity/Input Impedance

Phono-1, 2: 2.5 mV / 50 k ohm

Tuner: 320 mV / 40 k ohm

Aux. Tape: 320 mV / 40 k ohm

Maximum Allowable Input

Phono: 200 mV 1 kHz

RIAA Deviation: less than ±0.2 dB (20 Hz to 20 kHz)

Signal to Noise Ratio (IHF. A network)

Phono: better than 90 dB (input terminal shorted)

Tuner, Tape, Aux: better than 105 dB (input terminal shorted)

Aux → Pre Out Frequency Response

Tone Defeat: 5 Hz to 100 kHz $^{+0}_{-1}$ dB

Tone Control Section Variable Range

Bass: 100 Hz ±8 dB

Treble: 10 kHz ±8 dB

Filter Characteristic

Subsonic: 20 Hz, −6 dB/oct

Loudness Control Characteristic

Low range: 100 Hz + 7 dB

High range: 10 kHz + 6 dB

Power Source: AC 220V, 50 Hz

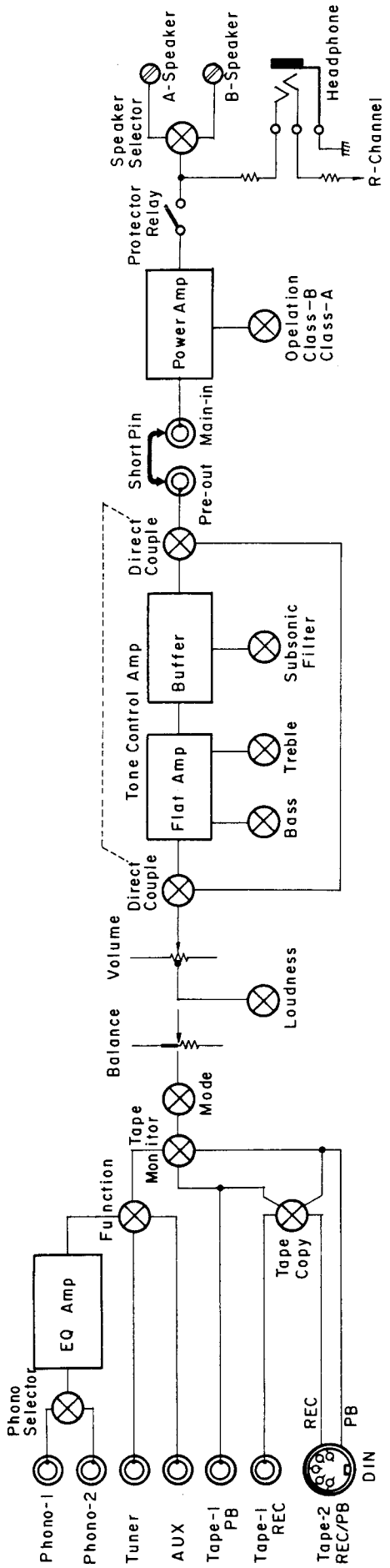
Power Consumption: 440 W (at max. output power)

Dimensions: 434 (W) x 164 (H) x 400 (D) mm
17-5/64" (W) x 6-29/64" (H) x 15-3/4" (D)

Weight: 16 kg, 35.3 lbs

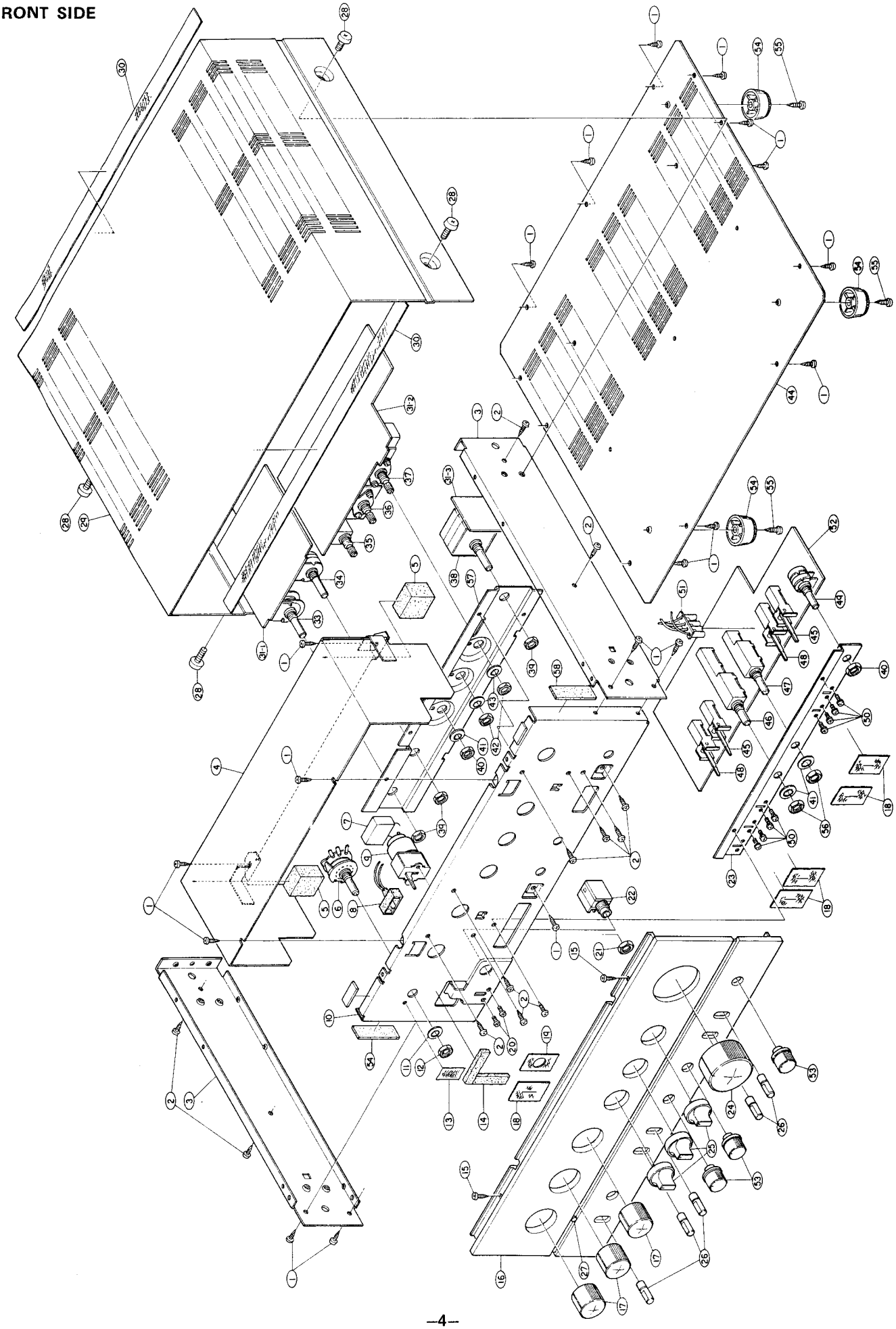
These contents are subject to alteration without prior notice.

BLOCK DIAGRAM

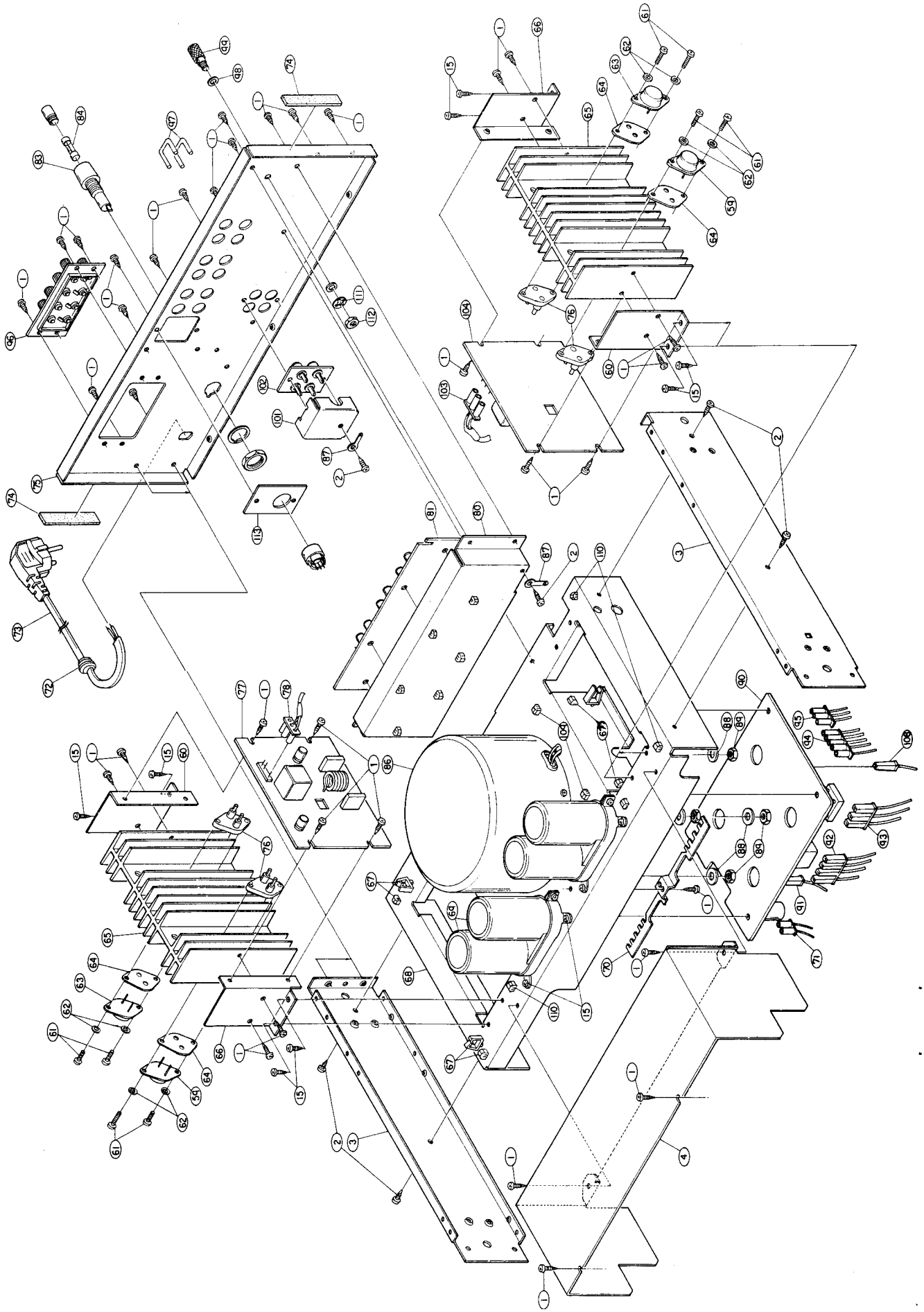


EXPLODED VIEW OF CHASSIS AND CABINET

FRONT SIDE



BACK SIDE

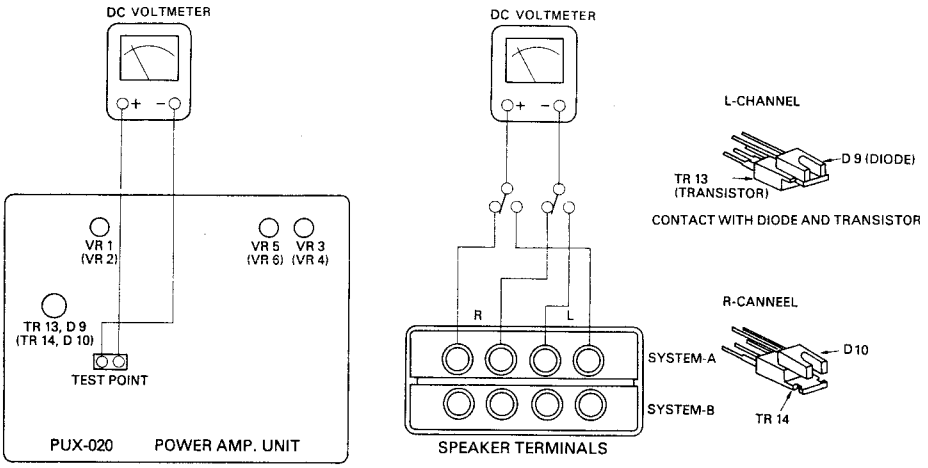


CHASSIS AND CABINET GROUP PARTS LIST

Ref. No.	Part No.	Part Name & Descriptions
1	4770064107	FIXING SCREW
2	4730353	TAPPING SCREW 3 x 6 (2)
3	4110148502	SIDE CHASSIS
4	4140114205	SHIELD COVER
5	4610074176	BLIND
6	2120119002	SPEAKER SWITCH
7	2558001007	OIL CAPACITOR 0.01μF
8	3930032019	PILOT LAMP 6.3V 0.15A
9	2124122008	POWER SWITCH
10	4110144409	FRONT CHASSIS
11	–	–
12	–	–
13		ADHESIVE TAPE
14		BLIND
15	4730354035	TAPPING SCREW 3 x 8
16	1440375103	FRONT PANEL ASS.
17	1120161006	KNOB ASS.
18		BLIND SHEET
19	–	–
20	4711304033	CROSS PAN SCREW 3 x 8
21		11 mm NUT
22	2048011101	HEAD PHONE JACK
23	4110146106	CONTROL BRACKET (B)
24	1120160007	KNOB ASS.
25	1120162209	KNOB ASS.
26	1120166108	LEVER KNOB
27	1430041007	PILOT LENS
28	SC-1162	SPECIAL SCREW
29	1020063440	TOP COVER
30	1220007057	SPACER
31	ETC-259B	CONTROL (A) UNIT
32	–	–
33	2110161109	100 k ohm x 2 POTENTIOMETER
34	2110162001	100 k ohm x 2 POTENTIOMETER
35	2120114007	ROTARY SWITCH
36	2120115019	FUNCTION SWITCH
37	2120127007	FUNCTION SWITCH
38	2110160100	50 k ohm x 2 POTENTIOMETER
39		8 mm NUT
40		7 mm NUT
41		7 mm TOOTH WASHER
42		9 mm NUT
43		9 mm TOOTH WASHER
44	1050188405	BOTTOM COVER
45	2124110007	LEVER SWITCH
46	2120118003	ROTARY SWITCH
47	2120117004	ROTARY SWITCH
48	2124110010	LEVER SWITCH
49	2110163107	100 k ohm x 2 POTENTIOMETER
50	4700009006	CROSS PAN SCREW 3 x 6
51		4P CONNECTION CORD
52	ETC-277	CONTROL (B) UNIT
53	1120163208	KNOB ASS.
54	1040040003	FOOT
55	4730456014	TOPPING SCREW 4 x 12 (2)
56		7 mm NUT

Ref. No.	Part No.	Part Name & Descriptions
57	4110145204	CONTROL BRACKET (A)
58	4610061121	RUBBER SHEET
59	2740037014	2SD427 (R) or (O) TRANSISTOR
60	4120372106	RADIATOR BRACKET (A)
61	4711809033	CROSS PEN SCREW 3 x 18
62	4753001051	3 TOOTH WASHER
63	2720024005	2SB557 (O) TRANSISTOR
64		INSULATING SHEET
65	4170077105	POWER RADIATOR
66	4120373105	RADIATOR BRACKET (B)
67	MD-4232	WIRE CLIP
68	4110147309	MAIN CHASSIS
69	2546031007	6800μF 50 V CAPACITOR
70	2050095102	EARTH PLATE
71		2P CONNECTOR
72	4450020005	CORD BUSH
73	2062016001	AC CORD
74	4610061118	RUBBER SHEET
75	1050294001	BACK PANEL
76	2070002007	TRANSISTOR SOCKET
77	PUX-020L	POWER AMPLIFIER UNIT (L)
78		3P CONNECTOR CORD
79	–	–
80	4140113002	INPUT BRACKET
81	ETC-143	INPUT TERMINAL UNIT
82	–	–
83	2020012005	FUSE HOLDER
84	2061015087	FUSE 4.0A TIME LAG
85	–	–
86	2335127009	POWER TRANSFORMER
87	2050003000	3 T LUG TERMINAL
88	4752006002	6 mmS WASHER
89	4756012005	6 mm NUT
90	ETC-280	POWER SOURCE & PROTECTOR UNIT
91		1P CONNECTOR ASS.
92		4P CONNECTOR CORD
93		3P CONNECTOR CORD
94	2038004005	5P CONNECTOR CORD
95		3P CONNECTOR CORD
96	2050070004	8P TERMINAL
97	2056037005	SHORT PIN
98	4770088002	4.1 mm WASHER
99	2050043109	GND TERMINAL
100	–	–
101	4140057207	BOARD BRACKET
102	2036043000	4P CONNECTOR BASE
103	2034093052	3P CONNECTOR CORD
104	PUX-020R	POWER AMP UNIT (R)
105	–	–
106	–	–
107	–	–
108	2030014048	1P CONNECTOR ASS.
109	MD-5271	P.C.B. SUPPORT
110	MD-4368	WIRE CLIP
111	4753100004	4 mm TOOTH WASHER
112	4770006004	4 mm NUT
113	4410316005	DIN PLATE

METHOD OF ADJUSTMENTS



DATA FOR ADJUSTMENTS

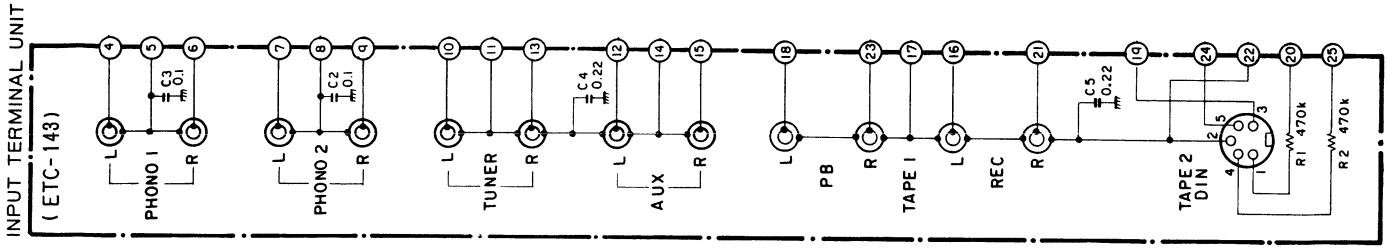
1. Confirm that forming has been effected as shown in the drawing for D9 and TR13, and D10 and TR14, respectively of the L- and R-channels. (PUX-020)
2. The amplifier switchs should be set as follows:
   (1) SPEAKERS switchs to "A" system.
   (2) VOLUME to minimum position.
   (3) DIRECT COUPLE to OFF.
   (4) POWER switch to OFF.
   (5) OPERATION switch to "B" position.
   (6) Confirm that a U-sharped short pin is inserted between the PRE-OUT and MAIN-IN terminals.
3. (1) Connect a D.C. voltmeter to the SYSTEM-A terminal.
   (2) Connect a D.C. voltmeter to the test points of both the L- and R-channels of the PUX-020. Special attention should be paid here with regard to the polarities of the test point voltages: make sure that 16 is — and 17 + for the L-channel, and that 35 is — and 36 + for the R-channel.
4. (1) After setting the voltage regulator to 0 V, switch the amplifier's power switch on.
   (2) While ovserving the indication of the D.C. voltmeter, raise the power supply voltage from zero to the rated voltage by using the voltage regulator, and carry out the preliminary adjustments of (3) and (4) in a swift manner.
   (3) By adjusting VR1 (L-channel) and VR2 (R-channel) of the PUX-020, regulate the speaker terminal voltage to the range of 0 V ±10 mV.
   (4) By adjusting VR5 (L-channel) and VR6 (R-channel) of the PUX-020, regulate the rest point voltages to 12 mV (10 to 14 mV) [Collector current to 26 mA (22 to 30 mA)].
5. (1) On completion of the preliminary adjustments described above, carry out the main adjustments described below.
   (2) By adjusting VR1 (L-channel) and VR2 (R-channel), adjust the speaker terminal voltage again so that it will be in the range of 0 V ±10 mV.
   (3) Adjust VR5 (L-channel) and VR6 (R-channel) again, regulating the test point voltage to 17 mV ±1 mV (Collector current to 26 mA ±2 mA).
   (4) With the above adjustments, the speaker terminal voltage adjustment and idling current adjustment for B-class operations have been completed.
6. (1) Change over the OPERATION switch to Class A.
   (2) By adjusting VR3 (L-channel) and VR4 (R-channel) of the PUX-020, carry out adjustment of the test point voltage, regulating it to 470 mV ±10 mV (Collector current to 1 A ±0.02 A).
7. (1) Switch over the OPERATION switch and effect aging for 10 minutes.
   (2) By adjusting VR3 (L-channel) and VR4 (R-channel) of the PUX-020, regulate the test point voltage to 500 mV ±5 mV (Collector current to 1.06 A ±0.01 A). With the above operations, idling current adjustment for A-class operations has been completed.

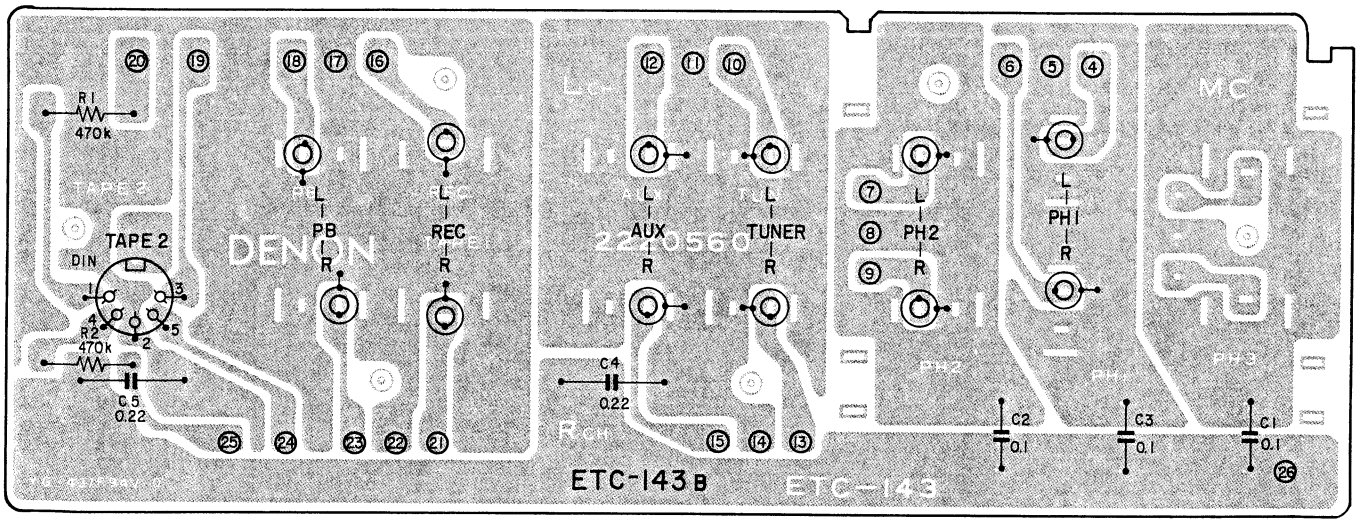
CAUTION

1. Never switch off power until the idling current adjustments for Class-A operations have been completed.
2. Special attention should be paid in handling the variable resistors used for adjustments, i.e., VR3 and VR4, and VR5 and VR6, as they can be easily mistaken for one another.
   If by mistake, VR5, or VR6 has been used for the idling current adjustment for A-class operations, readjustment must be carried out (after confirming that the radiator of the power amplifier has cooled down) for B-class operations, since the mistake will cause a deviation in the adjustment for B-class operations. On completion of this, carry out adjustments for A-class operations again.
3. The adjustment of "6. (2)" should be effected after about 10 seconds have passed following switch-on of the OPERATION switch.

PRINTED CIRCUIT BOARD PATTERNS AND PARTS LIST

INPUT TERMINAL UNIT ETC-143



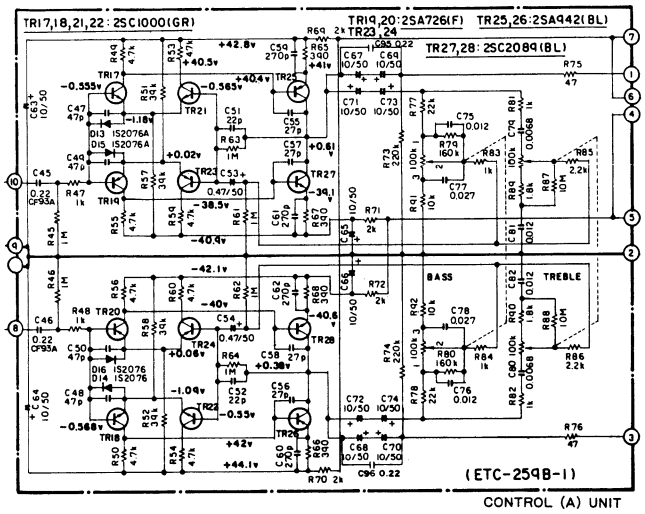


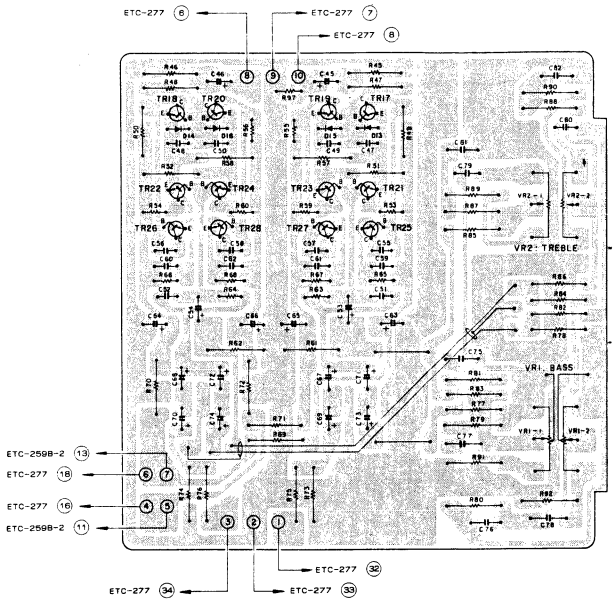
ETC-143 PARTS LIST

Ref. No.	Part No.	Part Name & Descriptions			
	RESISTORS, CAPACITORS				
R1,2	2410378003	470 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
C2,3	2531027000	0.1μF	+80,–20%	50V	FIXED CERAMIC CAPACITOR
C4,5	2551088003	0.22μF	±10%	50V	FIXED PLASTIC FILM CAPACITOR
	OTHER PARTS				
	2220560001	P.C. OCARD			
	2048009003	1P JACK		FOR PHONO, TUNER, AUX, P.B.	
	2048007005	1P JACK		FOR REC1,2	
	2040055000	6P CONNECTOR		FOR TUNER, AUX	
	2038058019	5P CONNECTOR		FOR TAPE R	
	2038058006	5P CONNECTOR		FOR TAPE L	
	2038059005	5P CONNECTOR		FOR OHONO 1, 2	
	4450033005	WIRE CLAMP BAND		USED 6	
	2040046006	5P PIN SOCKET			
	4140113002	INPUT BRACKET			
	MD-5271	P.C.B. SUPOORT		USED 6	

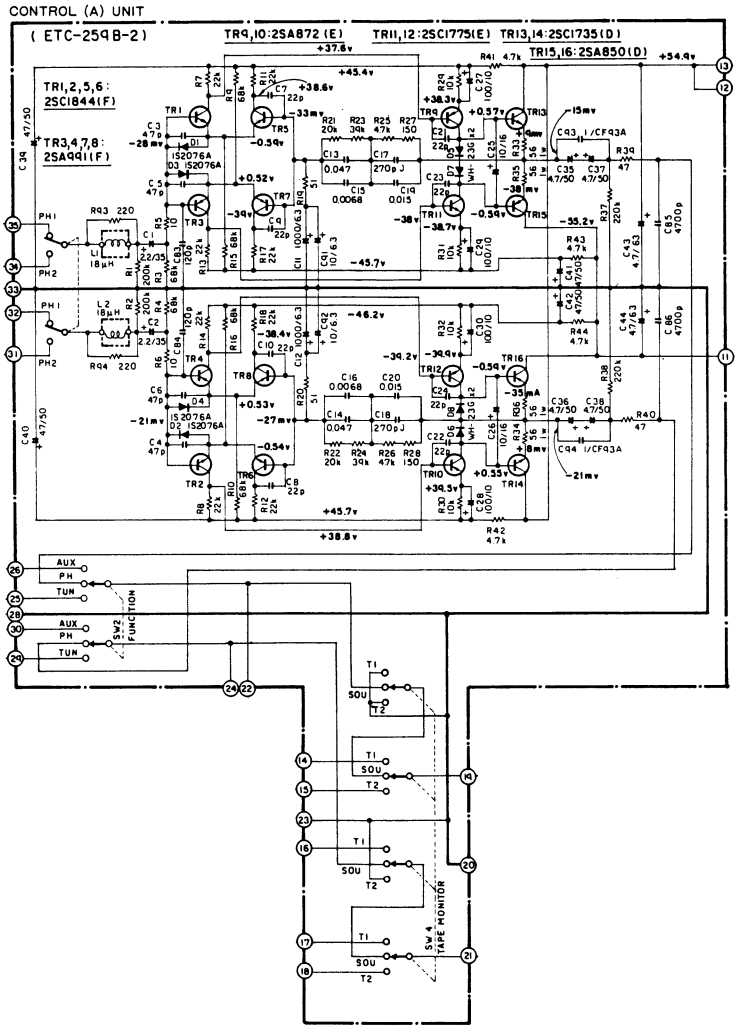
CONTROL (A) UNIT ETC-259B-1, -2, -3

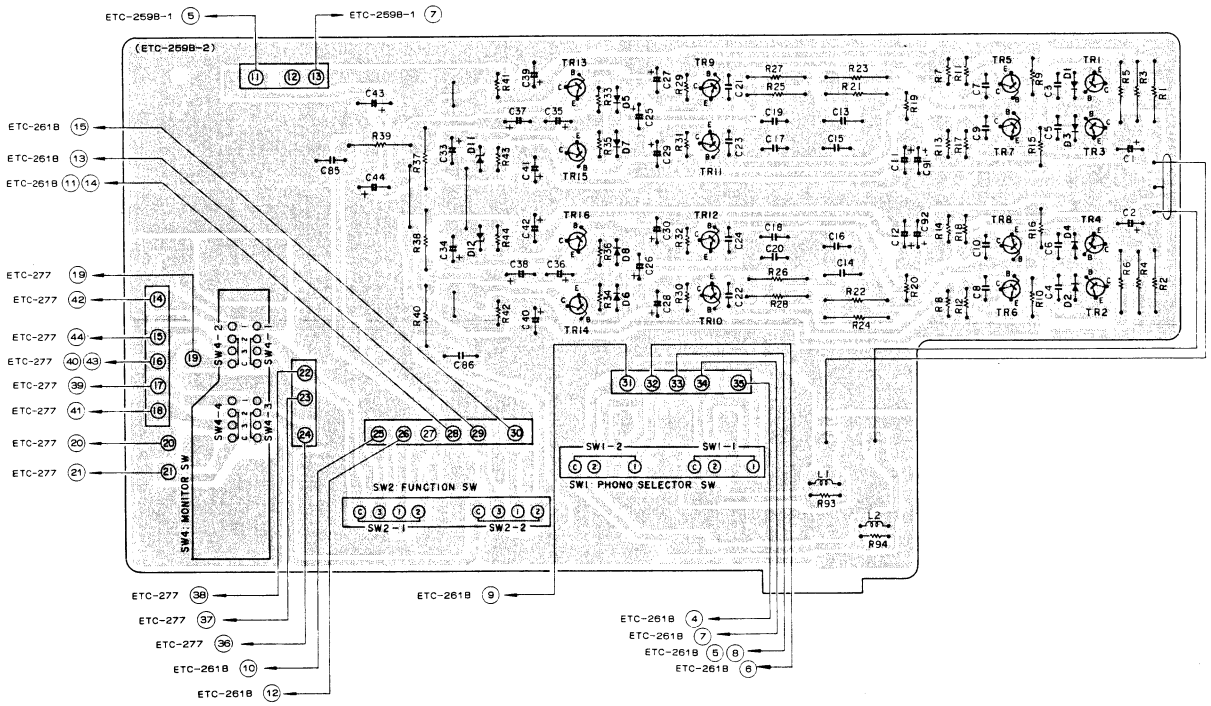
(1) TONE UNIT



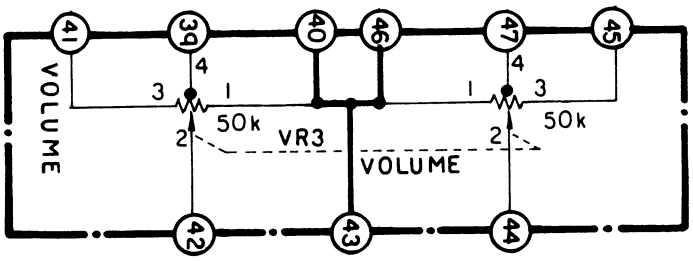


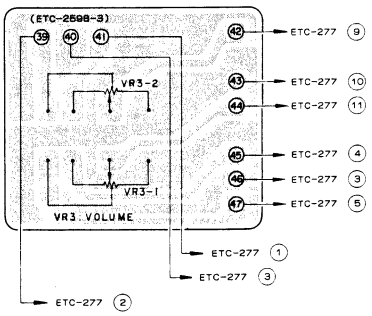
(2) EQUALIZER AMP UNIT





(3) VOLUME UNIT





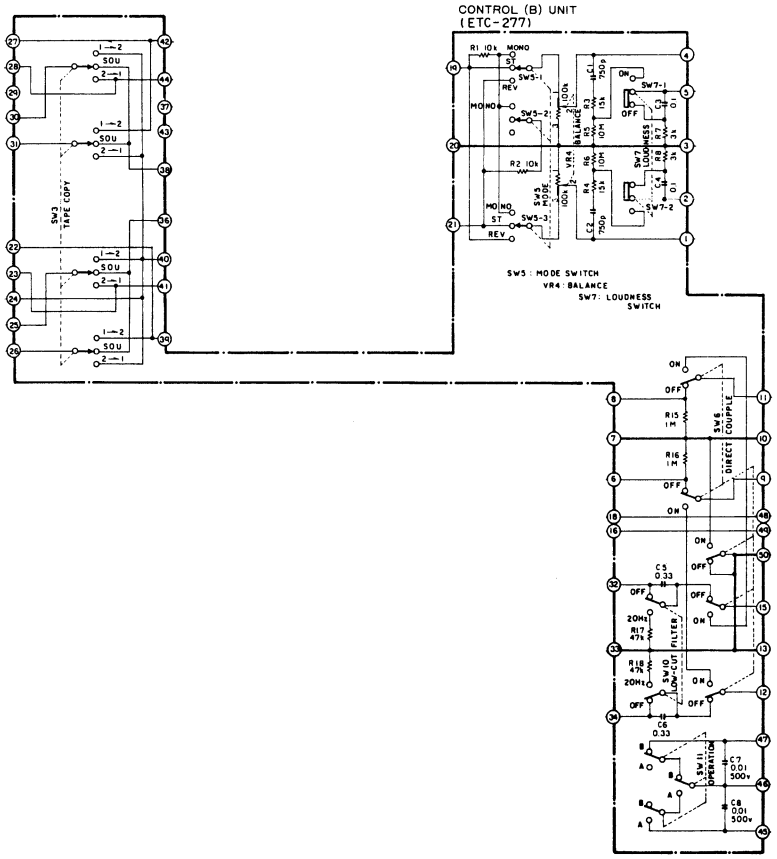
ETC-259B PARTS LIST

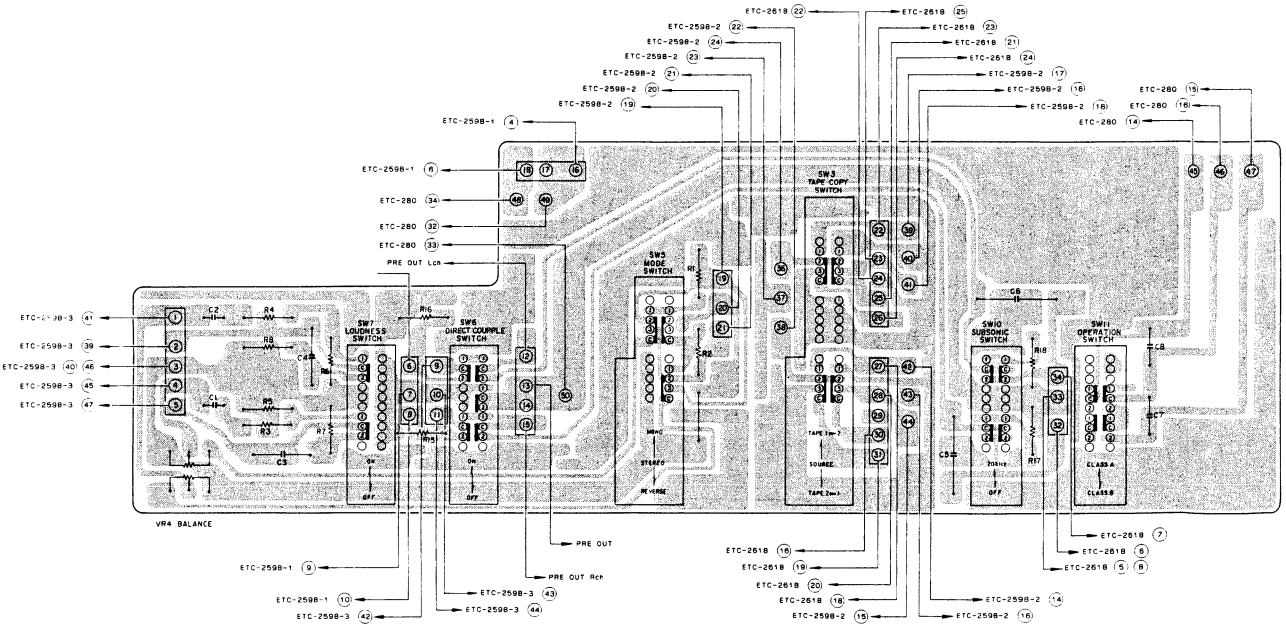
Ref. No.	Part No.	Part Name & Descriptions	
	SEMI CONDUCTORS		
TR1,2,5,6	2730188009	2SC1844 (F)	TRANSISTOR
TR3,4,7,8	2710095002	2SA991 (F)	TRANSISTOR
TR9,10	2710070001	2SA872 (E)	TRANSISTOR
TR11,12	2730158026	2SC1775 (E)	TRANSISTOR
TR13,14	2730163011	2SC1735 (D)	TRANSISTOR
TR15,16	2710072009	2SA850 (D)	TRANSISTOR
TR17,18,21,22	2730098034	2SC1000 (GR)	TRANSISTOR
TR19,20,23,24	2710087007	2SA726 (F)	TRANSISTOR
TR25,26	2710092005	2SA942 BL)	TRANSISTOR
TR27,28	2730184003	2SC2089 (BL)	TRANSISTOR
D1,2,3,4, 13,14,15,16	2760049008	1S2076	DIODE
D5,6,7,8	2760171028	HV-23G (YL)	

(Con.)

Ref. No.	Part No.	Part Name & Descriptions			
	RESISTORS				
R5,6	2410266005	10 ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R39,40,75,76	2410282005	47 ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R27,28	2410294006	150 ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R47,48	2410314009	1 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R89,90	2410320006	1.8 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R85,86	2410322004	2.2 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R69,70,71,72	2410321005	2 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R82,82,83,84	2410314009	1 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R49,50	2410330009	4.7 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R91,92	2410338001	10 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R77,78	2410346006	22 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R51,52,57,58	2410352003	39 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R3,4	2410358007	68 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R79,80	2410367001	160 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R1,2	2410369009	200 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R37,38,73,74	2410370001	220 k ohm	±5%	1/4W	FIXED CARBON FILM STANDING TYPE
R45,46,61,62	2410765001	1 M ohm	±5%	1/4W	FIXED CARBON FILM STANDING TYPE
R41,42,43,44 53,54,55,56	2412020058	4.7 k ohm	±5%	1/4W	FIXED CARBON FILM STANDING TYPE
R93,94	2412002005	220 ohm	±5%	1/4W	FIXED CARBON FILM STANDING TYPE
R19,20	2412026052	51 ohm	±5%	1/4W	FIXED CARBON FILM STANDING TYPE
R65,66,67,68	2412002034	390 ohm	±5%	1/4W	FIXED CARBON FILM STANDING TYPE
R59,60	2412020058	4.7 k ohm	±5%	1/4W	FIXED CARBON FILM STANDING TYPE
R29,30,31,32	2412020090	10 k ohm	±5%	1/4W	FIXED CARBON FILM STANDING TYPE
R9,10,15,16	2412003004	6.8 k ohm	±5%	1/4W	FIXED CARBON FILM STANDING TYPE
R63,64	2410773006	1 M ohm	±5%	1/4W	FIXED CARBON FILM STANDING TYPE
R25,26	2412032046	4.7 k ohm	±2%	1/4W	FIXED CARBON FILM STANDING TYPE
R21,22	2412012053	20 k ohm	±2%	1/4W	FIXED CARBON FILM STANDING TYPE
R23,24	2412032059	39 k ohm	±2%	1/4W	FIXED CARBON FILM STANDING TYPE
R87,88	2420203002	10 M ohm	±10%	1/4W	FIXED CARBON COMPOSITION RESISTOR
R7,8,13,14	2452011085	22k ohm	±1%	1/4W	FIXED METAL OXIDE FILM RESISTOR
R11,12,17,18	2412022043	22 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R33,34,35,36	2440026008	56 ohm	±5%	1W	FIXED METAL OXIDE FILM RESISTOR
	CAPACITORS				
C3,4,5,6	2333653003	47pF	±10%	50V	FIXED CERAMIC CAPACITOR
C7,8,9,10	2533649004	22pF	±10%	50V	FIXED CERAMIC CAPACITOR
C55,56,57,58	2533650006	27pF	±10%	50V	FIXED CERAMIC CAPACITOR
C47,48,49,50	2533653003	47pF	±10%	50V	FIXED CERAMIC CAPACITOR
C83,84	2533658008	120pF	±10%	50V	FIXED CERAMIC CAPACITOR
C59,60,61,62	2533662007	270pF	±10%	50V	FIXED CERAMIC CAPACITOR
C17,18	2533637003	270pF	±5%	50V	FIXED CERAMIC CAPACITOR
C21,22,23,24 51,52	2533649004	22pF	±10%	50V	FIXED CERAMIC CAPACITOR
C15,16	2551121009	0.0068μF	±5%	50V	FIXED PLASTIC FILM CAPACITOR
C19,20	2554073086	0.015μF		100V	FIXED PLASTIC FILM CAPACITOR
C13,14	2554075000	0.047μF		100V	FIXED PLASTIC FILM CAPACITOR
C85,86	2551068007	0.0047μF	±10%	50V	FIXED PLASTIC FILM CAPACITOR
C79,80	2551121009	0.0068μF	±5%	50V	FIXED PLASTIC FILM CAPACITOR
C75,76,81,82	2551121038	0.012μF	±5%	50V	FIXED PLASTIC FILM CAPACITOR
C77,78	2551121070	0.027μF	±5%	50V	FIXED PLASTIC FILM CAPACITOR
C45,46	2561014012	0.22μF	±10%	250V	FIXED METALIZED PLASTIC FILM CAPACITOR
C93,94,95,96	2561014009	1μF	±10%	250V	FIXED METALIZED PLASTIC FILM CAPACITOR
C1,2	2541031002	22μF	±20%	35V	FIXED TANTALUM CAPACITOR
C91,92	2541003001	10μF	±20%	6.3V	FIXED TANTALUM CAPACITOR
C11,12	2344007004	1000μF		6.3V	FIXED ELECTROLYTIC CAPACITOR
C27,28,29,30	2544010004	100μF		10V	FIXED ELECTROLYTIC CAPACITOR
C25,26	2344015009	10μF		16V	FIXED ELECTROLYTIC CAPACITOR
C63,64,65,66	2544047006	10μF		50V	FIXED ELECTROLYTIC CAPACITOR
C53,54	2544043000	0.47μF		50V	FIXED ELECTROLYTIC CAPACITOR
C35,36,37,38	2544046007	4.7μF		50V	FIXED ELECTROLYTIC CAPACITOR
C67,68,69,70 71,72,73,74	2544047006	10μF		50V	FIXED ELECTROLYTIC CAPACITOR
C39,40,41,42	2544049004	47μF		50V	FIXED ELECTROLYTIC CAPACITOR
C43,44	2544059036	4.7μF		63V	FIXED ELECTROLYTIC CAPACITOR
	OTHER PARTS				
	2220358307	P.C. BOARD			
	2050112069	6P CONNECTOR BASE			
	2050112056	5P CONNECTOR BASE			
	2050112030	3P CONNECTOR BASE			
	4140116106	SHIELD COVER			
	4110145204	CONTROL BRACKET (A)			
SW4	2120114007	ROTARY SWITCH			
SW2	2120115019	FUNCTION SWITCH			
SW1	2120127007	FUNCTION SWITCH			
VR3	2110160100	V3520V30RA503-	50 k ohm x 2		POTENTIOMETER
VR1	2110161109	V2420V30RE104-	100 k ohm x 2		POTENTIOMETER
VR2	2110162001	V2420V30RE104-	100 k ohm x 2		POTENTIOMETER
L1,2	2318017000	INDUCTOR			
	2090008146	JUMPER SHORTLEAD USED 4			P = 5 mm
	2090008117	JUMPER SHORTLEAD USED 4			p = 12.5 mm

CONTROL (B) UNIT ETC-277

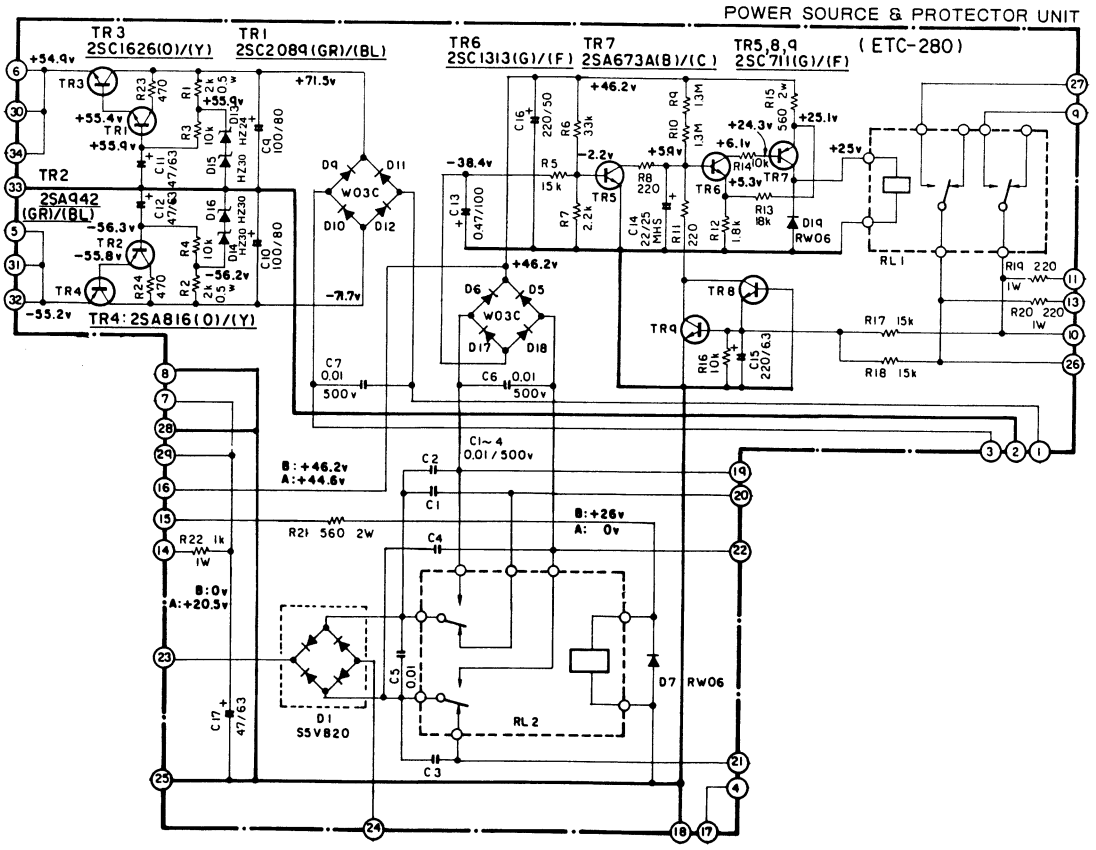


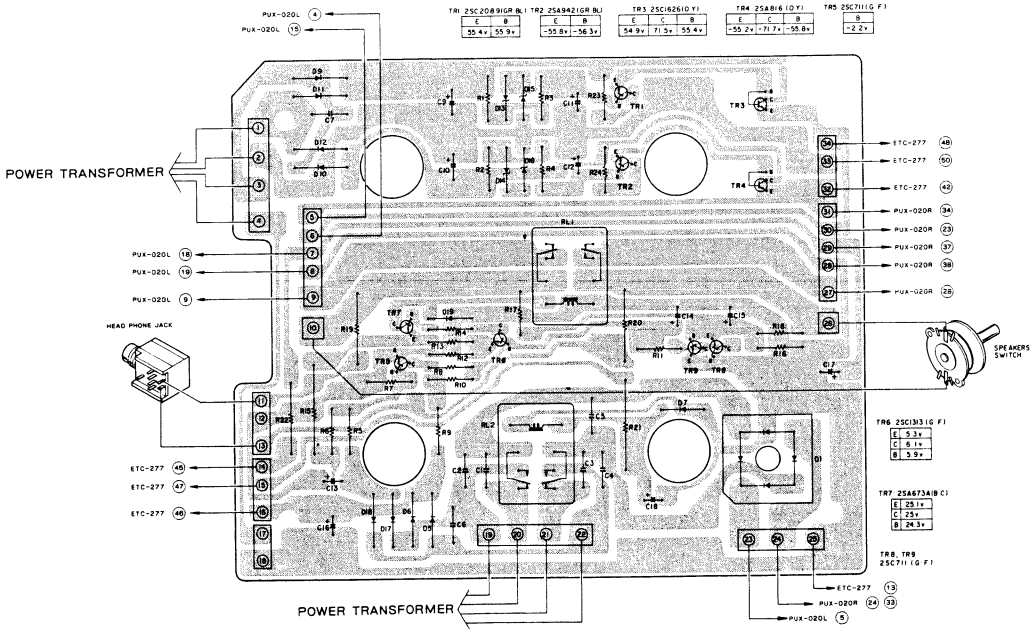


ETC-277 PARTS LIST

Ref. No.	Part No.	Part Name & Descriptions			
	RESISTORS				
R7,8	2410325001	3 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R1,2	2410338001	10 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R3,4	2410342000	15 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R17,18	2410365003	130 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R15,16	2410765001	1 M ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R5,6	2420203003	10 M ohm	±10%	1/4W	FIXED CARBOM COMPOSITION RESISTOR
	CAPACITORS				
C3,4	2554081081	0.1μF	±5%	100V	FIXED PLASTIC FILM CAPACITOR
C5,6	2554082064	0.22μF	±5%	100V	FIXED PLASTIC FILM CAPACITOR
C1,2	2556096003	750pF	±5%	50V	FIXED PLASTIC FILM CAPACITOR
C7,8	2531053003	0.01μF	+100,−0%	500V	FIXED CERAMIC CAPACITOR
	OTHER PARTS				
	2220421108	P.C. BOARD			
	2050112030	3P CONNECTOR BASE	USED 5		
	2050112056	5P CONNECTOR BASE	USED 3		
	2050112043	4P CONNECTOR BASE	USED 1		
	2038060007	5P CONNECTOR			
	2034089066	3P CONNECTOR			
	2034114009	3P CONNECTOR			
	2034114012	3P CONNECTOR			
	4110146106	CONTROL BRACKET (B)			
SW7	2124110007	LEVER SWITCH	FOR LOUDNESS		
SW5,11	2124110010	LEVER SWITCH	FOR OPER, DIR, COUP.		
	4700009006	CROSS PAN SCREW WITH S. WASHER 3 x 6	USED 8		
VR4	2110163107	VR1620V25RW104K	POTENTIOMETER 100 k ohm x 2 FOR BALANCE		
SW5	2120117004	ROTARY SWITCH	FOR MODE		
SW3	2120118003	ROTARY SWITCH	FOR TAPE C		
	2090008117	JUMPER SHORT LEAD	USED 1	P = 12.5 mm	
	4770064107	FIXING SCREW	USED 2		
	4730353036	TAPPING SCREW (2) 3 x 6	USED 2		

POWER SOURCE AND PROTECTOR UNIT ETC-280



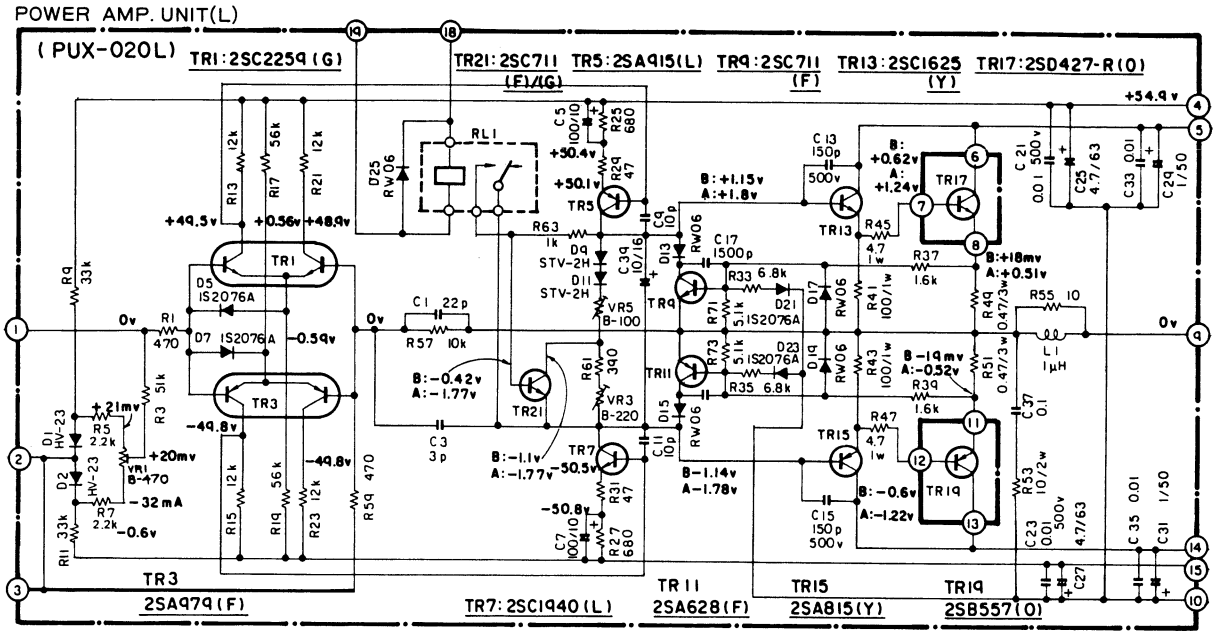


ETC-280 PARTS LIST

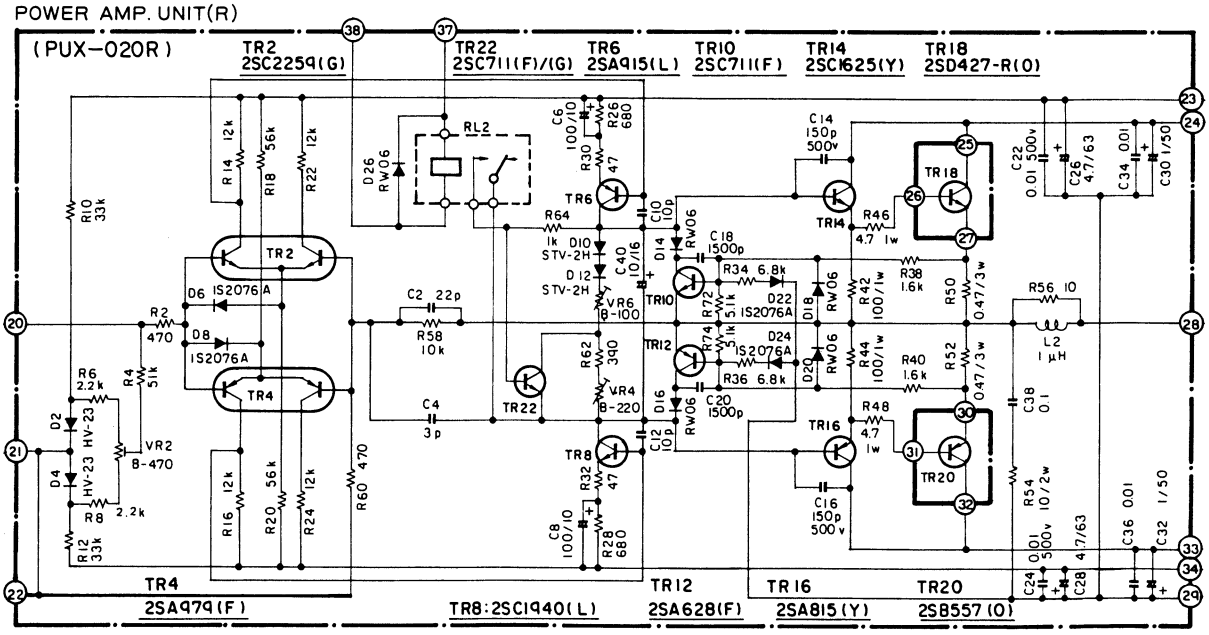
Ref. No.	Part No.	Part Name & Descriptions			
	SEMI CONDUCTORS				
TR1	2730184016 or	2SC2089 (GR)		TRANSISTOR	
TR1	2730184003	2SC2089 (BL)		TRANSISTOR	
TR2	2710092018 or	2SA942 (GR)		TRANSISTOR	
TR2	2710092005	2SA942 (BL)		TRANSISTOR	
TR3	2730177010 or	2SC1026 (D)		TRANSISTOR	
TR3	2730177007	2SC1026 (Y)		TRANSISTOR	
TR4	2710088019 or	2SA816		TRANSISTOR	
TR4	2710088006	2SA816 (Y)		TRANSISTOR	
TR5,8,9	2730064068 or	2SC711 (G)		TRANSISTOR	
TR5,8,9	2730064055	2SC711 (F)		TRANSISTOR	
TR6	2730171016 or	2SC1313 (G)		TRANSISTOR	
TR6	2730171003	2SC1313 (F)		TRANSISTOR	
TR7	2710040004 or	2SA673A (B)		TRANSISTOR	
TR7	2710040057	2SA673A (C)		TRANSISTOR	
D1	2760195004	S5VB20		DIODE	
D5,6,9,10, 11,12,17,18	2760191008	W03C		DIODE	
D7,19	2760214008	RW06		DIODE	
D13,17	2760220005	HZ-24		DIODE	
D15,16	2760224001	HZ-30		DIODE	
	RESISTORS				
R23,24	2410306004	470 ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R8,11	2410298002	220 ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R7	2410322004	2.2 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R12	2410320006	1.8 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R3,4,14,16	2410338001	10 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R5,17,18	2410342000	15 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R6	2410350005	33 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R13	2410344008	18 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R9,10	2410768008	1.3 M ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R1,2	2410192001	2k ohm	±5%	1/2W	FIXED CARBON FILM RESISTOR
R22	2440041009	1k ohm	±5%	1W	FIXED METAL OXIDE FILM RESISTOR
R19,20	2440033004	220 ohm	±5%	1W	FIXED METAL OXIDE FILM RESISTOR
R15,21	2440095000	500 ohm	±5%	2W	FIXED METAL OXIDE FILM RESISTOR
	CAPACITORS				
C15	2544004007	220μF		6.3V	FIXED ELECTROLYTIC CAPACITOR
C14	2549005027	22μF	±20%	25V	FIXED ELECTROLYTIC CAPACITOR
C16	2544051005	220μF		50V	FIXED ELECTROLYTIC CAPACITOR
C1,12,17	2544059023	47μF		63V	FIXED ELECTROLYTIC CAPACITOR
C13	2544060038	0.47μF		100V	FIXED ELECTROLYTIC CAPACITOR
C9,10	2544063006	100μF		80V	FIXED ELECTROLYTIC CAPACITOR
C1,2,3,4,5,6,7	2531053003	0.01μF	+100,–0%	500V	FIXED CERAMIC CAPACITOR
	OTHER PARTS				
	2220419000	P.C. BOARD			
	2050112027	2P CONNECTOR BASE			
	2050112030	3P CONNECTOR BASE			
	2050112056	5P CONNECTOR BASE			
	EP-6071	BASE PIN		USED 13	
RL-1	2140016020	RELAY			
RL-2	2140031005	RELAY			

POWER AMPLIFIER UNIT PUX-020 (L) (R)

(L)

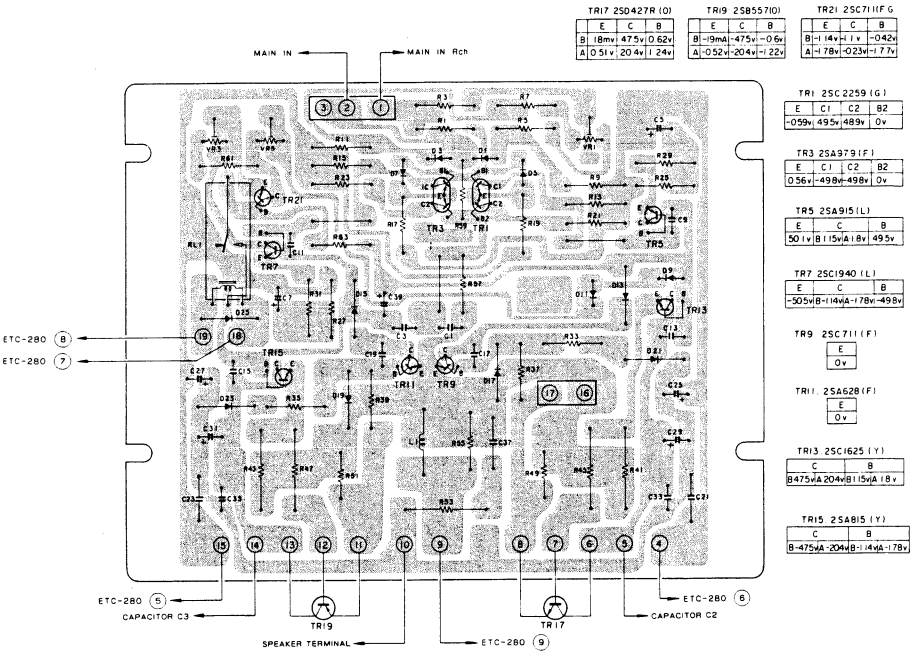


(R)

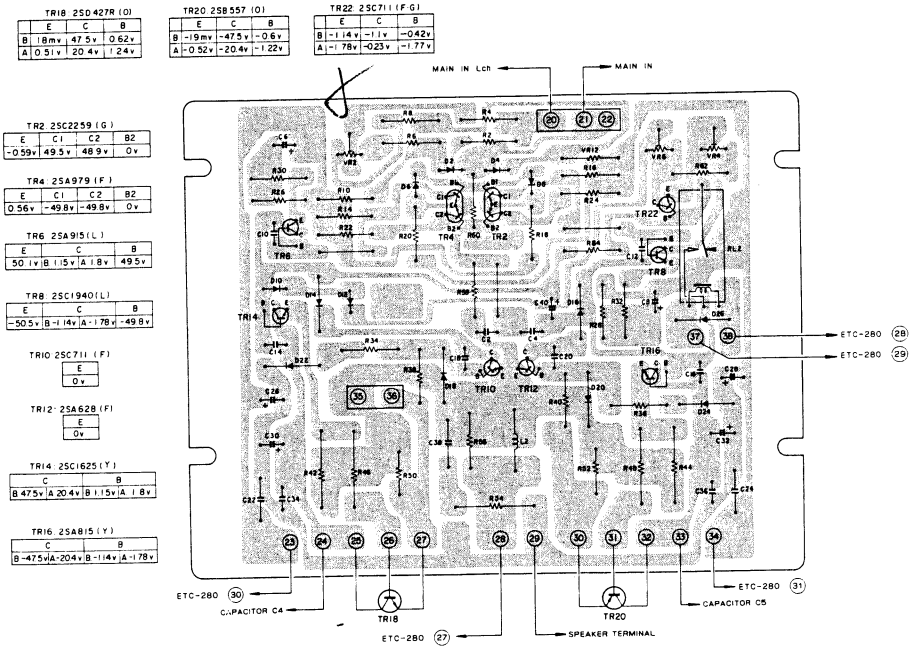


PUX-020 (L) (R)

(L)


TR17 2SD427R (O)
E C B
B 18mv 47.5v 0.62v
A 0.51v 20.4v 1.24v
TR19 2SB557(O)
E C B
B -19mA -475v -0.6v
A -0.52v -204v -1.22v
TR21 2SC711(F,G)
E C B
B -1.14v -1.1v -042v
A -1.78v -023v -1.77v
TR1 2SC2259 (G)
E C1 C2 B2
-059v 495v 489v 0v
TR3 2SA979 (F)
E C1 C2 B2
0.56v -498v -498v 0v
TR5 2SA915(L)
E C B
50.1v B 1.15v A 1.8v 49.5v
TR7 2SC1940 (L)
E C B
-505v B-1.14v A-1.78v -498v
TR9 2SC711 (F)
E
0v
TR11 2SA628(F)
E
0v
TR13 2SC1625 (Y)
C B
B 475v A 20.4v B 1.15v A 1.8v
TR15 2SA815 (Y)
C B
B-475v A -20.4v B-1.14v A-1.78v
MAIN IN
MAIN IN Rch
ETC-280 (8)
ETC-280 (7)
ETC-280 (5)
CAPACITOR C3
TR19
SPEAKER TERMINAL
TR17
ETC-280 (9)
ETC-280 (6)
CAPACITOR C2

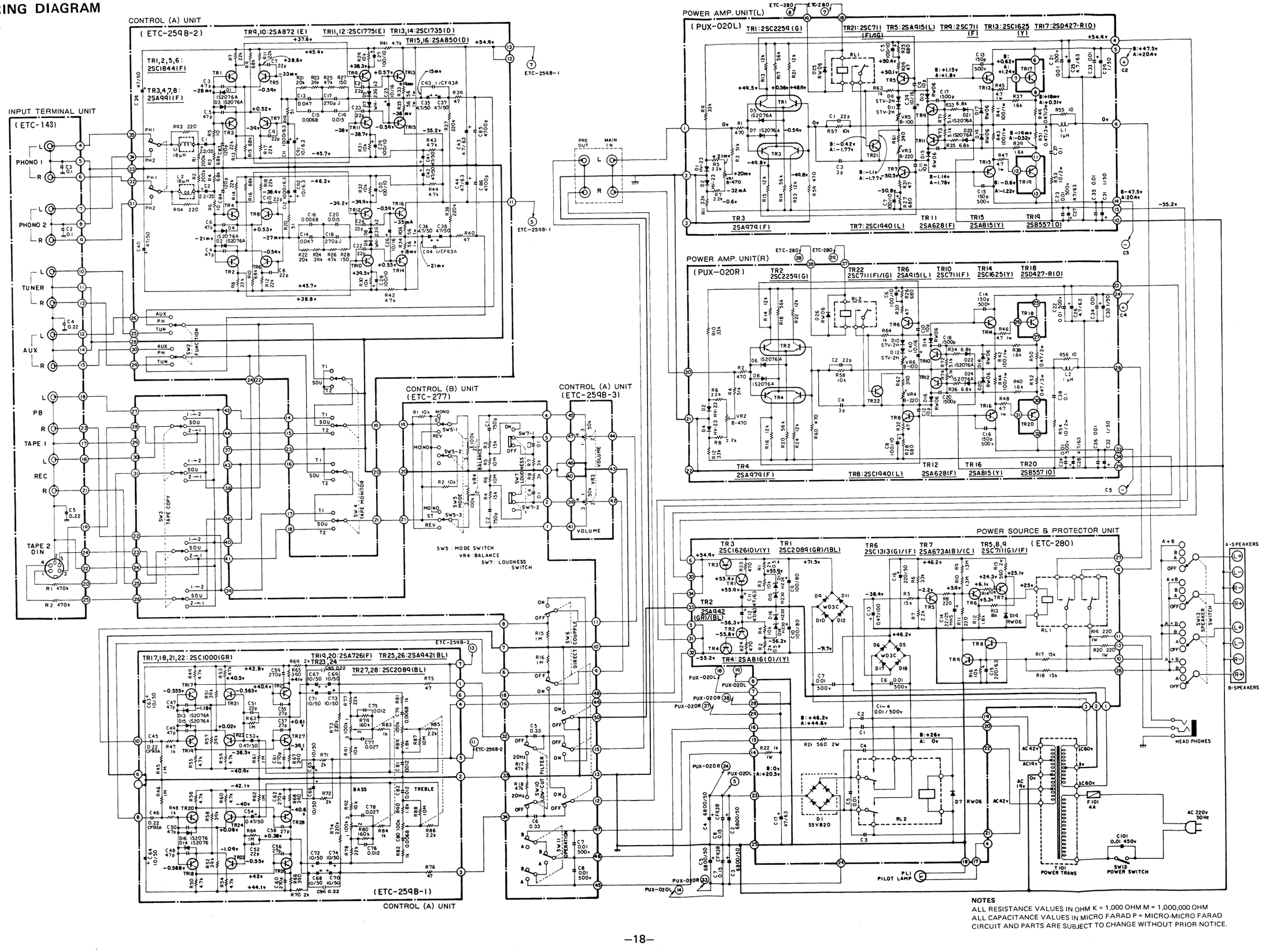
(R)


TR18 2SD427R (O)
E C B
B 18mv 47.5v 0.62v
A 0.51v 20.4v 1.24v
TR20 2SB557 (O)
E C B
B -19mv -475v -0.6v
A -0.52v -20.4v -1.22v
TR22 2SC711 (F,G)
E C B
B -1.14v -1.1v -042v
A -1.78v -023v -1.77v
TR2 2SC2259 (G)
E C1 C2 B2
-0.59v 49.5v 48.9v 0v
TR4 2SA979 (F)
E C1 C2 B2
0.56v -49.8v -49.8v 0v
TR6 2SA915(L)
E C B
50.1v B 1.15v A 1.8v 49.5v
TR8 2SC1940(L)
E C B
-50.5v B-1.14v A-1.78v -49.8v
TR10 2SC711 (F)
E
0v
TR12 2SA628(F)
E
0v
TR14 2SC1625(Y)
C B
B 475v A 20.4v B 1.15v A 1.8v
TR16 2SA815(Y)
C B
B-475v A-20.4v B-1.14v A-1.78v
MAIN IN Lch
MAIN IN
ETC-280 (30)
CAPACITOR C4
TR18
ETC-280 (27)
SPEAKER TERMINAL
TR20
ETC-280 (31)
CAPACITOR C5
ETC-280 (28)
ETC-280 (29)

PUX-020 PARTS LIST

Ref. No.	Part No.	Part Name & Descriptions			
	SEMI CONDUCTORS				
TR1,2	2730191009	2SC2259 (G)		TRANSISTOR	
TR3,4	2710098012	2SA979 (F)		TRANSISTOR	
TR1,6	2710093004	2SA915 (L)		TRANSISTOR	
TR7,8	2730186001	2SC1940 (L)		TRANSISTOR	
TR9,10	2730064055	2SC711 (F)		TRANSISTOR	
TR11,12	2710033022	2SA628 (F)		TRANSISTOR	
TR13,14	2730159012	2SC1625 (Y)		TRANSISTOR	
TR15,16	2710068000	2SA815 (Y)		TRANSISTOR	
TR21,22	2730064055 or	2SC711 (F)		TRANSISTOR	
TR21,22	2730064068	2SC711 (G)		TRANSISTOR	
D1,2,3,4	2760171028	HV-23G (YL)		DIODE	
D5,6,7,8	2760049011	1S2076A		DIODE	
D9,10,11,12	2760217005	STV-2H		DIODE	
D13,14,15,16 17,18,19,20	2760214008	RW06		DIODE	
D21,22,23,24	2760049011	1S2076A		DIODE	
D25,26	2760214008	RW06		DIODE	
	RESISTORS				
R55,56	2410266005	10 ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R29,30,31,32	2410282005	47 ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R61,62	2410304006	390 ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R1,2,59,60	2410306004	470 ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R25,26,27,28	2410310003	680 ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R63,64	2410314009	1 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R37,38,39,40	2410319004	1.6 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R5,6,7,8	2410322004	2.2 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R71,72,73,74	2410331008	5.1 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R33,34,35,36	2410334005	6.8 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R57,58	2410338001	10 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R13,14,15,16	2410340002	12 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R9,10,11,12	2410350000	33 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R3,4	2410355000	51 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R17,18,19	2410356009	56 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R21,22,23,24	2410340002	12 k ohm	±5%	1/4W	FIXED CARBON FILM RESISTOR
R45,46,47,48	2440013008	4.7 ohm	±5%	1W	FIXED METAL OXIDE FILM RESISTOR
R41,42,43,44	2440029005	100 ohm	±5%	1W	FIXED METAL OXIDE FILM RESISTOR
R53,54	2432020009	10 ohm	±10%	2W	FIXED WIRE WOUND RESISTOR
R49,50,51,52	2430023008	0.47 ohm	±5%	3.15W	FIXED WIRE WOUND RESISTOR
	CAPACITORS				
C3,4	2533596005	3pF	±0.25pF	50V	FIXED CERAMIC CAPACITOR
C1,2	2533611003	22pF	±5%	50V	FIXED CERAMIC CAPACITOR
C9,10,11,12	2534269001	10pF	±0.5pF	500V	FIXED CERAMIC CAPACITOR
C13,14,15,16	2534327008	150pF	±10%	500V	FIXED CERAMIC CAPACITOR
C17,18,19,20	2531005006	0.0015μF	±10%	50V	FIXED CERAMIC CAPACITOR
C33,34,35,36	2531024003	0.01μF	+80,–20%	50V	FIXED CERAMIC CAPACITOR
C21,22,23,24	2531053003	0.01μF	+100,–0%	500V	FIXED CERAMIC CAPACITOR
C37,38	2551084007	0.1μF	±10%	50V	FIXED PLASTIC FILM CAPACITOR
C5,6,7,8	2544010004	100μF		10V	FIXED ELECTROLYTIC CAPACITOR
C39,40	2344015009	10μF		16V	FIXED ELECTROLYTIC CAPACITOR
C29,30,31,32	2544044009	1μF		50V	FIXED ELECTROLYTIC CAPACITOR
C25,26,27,28	2544059036	4.7μF		63V	FIXED ELECTROLYTIC CAPACITOR
	OTHER PARTS				
	2220420002	P.C. BOARD			
	2220420015	P.C. BOARD			
	2050087026	2P TERMINAL		USED 2	
	2050112030	3P CONNECTOR BASE		USED 2	
VR3,4	2116003025	V10QB221		VARIABLE RESISTOR 220 ohm	
VR5,6	2116003009	V10QB101		VARIABLE RESISTOR 100 ohm	
VR1,2	2116003041	V10QB471		VARIABLE RESISTOR 470 ohm	
	4140116105	SHIELD COVER			
	2090008117	JUMPER SHORT LEAD		P = 12.5 mm USED 6	

WIRING DIAGRAM



NOTES
ALL RESISTANCE VALUES IN OHM K = 1,000 OHM M = 1,000,000 OHM
ALL CAPACITANCE VALUES IN MICRO FARAD P = MICRO-MICRO FARAD
CIRCUIT AND PARTS ARE SUBJECT TO CHANGE WITHOUT PRIOR NOTICE.